

REMARKS

In the Final Office Action, claims 1-40 were rejected. There are no outstanding amendments to be considered in the present Response. As such, claims 1-40 remain pending in the present patent application and are believed to be in condition for allowance. In view of the remarks set forth below, Applicants respectfully request reconsideration and allowance of all pending claims.

Oath/Declaration under C.F.R. §1.67(a)

In the Final Office Action, the Examiner stated that the declaration previously filed with regard to the present application is defective under 37 C.F.R. §1.67(a). Specifically, the Examiner objected to the declaration as being defective because:

[The declaration] does not state that the person making the oath or declaration acknowledges the duty to disclose to the Office all information known to the person to be material to **patentability** as defined in 37 C.F.R. 1.56.

Final Office Action, page 2. (Emphasis in original). Applicants respectfully traverse the Examiner's assertion that the declaration in the present application is defective in view of current United States Patent and Trademark Office (the "Office") practice guidelines.

On January 22, 2008, Jon W. Dudas, Under Secretary of Commerce for the United States Patent and Trademark Office released a notice bulletin ("Office Notice") regarding clarification of the "Duty of Disclosure" language required in oaths or declarations filed in non-provisional patent applications. For the Examiner's convenience, a copy of the Office Notice is attached hereto as Exhibit A. The Office Notice emphasized that declarations must contain the language "*material to patentability*," as set forth in 37 C.F.R. § 1.63(b)(3). The Office Notice further stated that any oaths or declarations filed on or after June 1, 2008 which do not contain the express language set forth in 37 C.F.R. §1.63(b)(3) will be objected to by the Office. *See* Office Notice, page 2. However, with regard to oaths and declarations filed *prior* to June 1, 2008, the Office stated:

The Office is hereby *sua sponte* waiving the express language requirement of 37 C.F.R. § 1.63(b)(3), where the oath or declaration was filed prior to June 1, 2008. The express language of 37 C.F.R. 1.63(b)(3) is waived only to the extent necessary such that an oath or declaration containing the “material to examination” or “in accordance with § 1.56(a)” language, or both, will be accepted as acknowledging the applicant’s duty to disclose information “material to patentability” as defined in 37 C.F.R. 1.56.

Office Notice, page 2. (Emphasis added). In other words, the express language requirement set forth in 37 C.F.R. §1.63(b)(3) will apply to declarations filed on or after June 1, 2008, but will be retroactively waived with respect to declarations filed *prior* to June 1, 2008.

With the foregoing in mind, Applicants note that because the declaration being objected to by the Examiner was filed concurrently with the present application on November 26, 2003, which is clearly *prior* to June 1, 2008, the express language requirement of 37 C.F.R. §1.63(b)(3) is waived in accordance with practice guidelines set forth in the Office Notice. Accordingly, Applicants respectfully request that the Examiner withdraw the objection to the declaration as being defective under the express language requirement of 37 C.F.R. §1.63(b)(3).

Rejections Under 35 U.S.C. §102

The Examiner rejected claim 1-40 under 35 U.S.C. §102(b) as being anticipated by the publication entitled, “Preliminary Studies of Cardiac Motion in Positron Emission Tomography,” by Huesman et al. (hereinafter “the Huesman reference”). Applicants respectfully traverse this rejection for at least the reasons set forth below.

Legal Precedent

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *See Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir.1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir.1990). That is, the prior art reference must show the *identical invention* “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Thus, for anticipation, the cited reference must not only disclose all of the recited features but must also disclose the *part-to-part relationships* between these features. *See Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir.1984). Accordingly, the Applicants need only point to a single element or claimed relationship not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. A *strict correspondence* between the claimed language and the cited reference must be established for a valid anticipation rejection.

Furthermore, during patent examination, the pending claims must be given an interpretation that is *reasonable* and *consistent* with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §2111 (describing the standards for claim interpretation during prosecution). Indeed, the *specification* is “the primary basis for construing the claims.” *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005). (Emphasis added). It is usually dispositive. *See id.* Interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. That is, recitations of a claim must be read as they would be interpreted by those of ordinary skill in the art. *See Rexnord Corp. v. Laliram Corp.*, 60 U.S.P.Q.2d 1851, 1854 (Fed. Cir. 2001); *see also* M.P.E.P. §2111.01. In summary, an Examiner, during

prosecution, must interpret a claim recitation as one of ordinary skill in the art would reasonably interpret the claim in view of the specification. *See In re American Academy of Science Tech Center*, 70 U.S.P.Q.2d 1827 (Fed. Cir. 2004).

1. The Huesman reference fails to teach or suggest “initiating and terminating the acquisition of a set of image data ... based on two or more prospective gating points.”

As an initial matter, Applicants note that in a telephonic interview conducted on November 19, 2007, Applicants, Applicants’ legal representatives, and the Examiner, discussed the failure of the Huesman reference to teach or suggest the acquisition of image data based on prospective gating points. A complete summary of the interview can be found in the previously filed Response to the Office Action mailed August 22, 2007, as well as in the Interview Summary mailed by the Examiner on November 23, 2007.

During the interview, Applicants noted that although the term “prospective gating” is used in both the Huesman reference and the present application, the Huesman reference does not appear to define “prospective gating” in a manner that is consistent with the present application. *See* Response to the Office Action mailed August 22, 2007, pages 25-26. Applicants further explained to the Examiner that the present application defines “prospective gating” as first analyzing motion data to extract gating points corresponding to periods of absolute minimal motion, and then using these extracted gating points to acquire image data, such that the image data is acquired only during intervals defined by the prospective gating points. *See* Application, page 19, line 29 to page 20, line 9; *see also* Fig. 3. Thus, to be perfectly clear, embodiments of the present do not acquire a continuous stream of image data, but rather acquire portions of the image data in an interrupted and non-continuous manner, such that the acquisition of image data is triggered only during the time intervals defined by the extracted prospective gating points, and is ignored for those intervals outside of the gating intervals. *See* Application, page 19, line 29 to page 20, line 9; *see also* Fig. 3. Applicants further pointed out during the interview that the Huesman reference, to the contrary, appears to describe “prospective

gating” as a method of binning or classifying a *continuously acquired and uninterrupted* set of image data into various groupings or categories based upon “gating states” which correspond to a particular state of motion that an organ or organs of interest are undergoing at the time the image data is acquired. In other words, although the Huesman reference appears to make use of “gating states,” the states are merely used to categorize previously acquired data, not to trigger the acquisition of data. In summary, Applicants asserted that these two disparate methods of operation, despite the unfortunate use of similar language cannot possibly be considered analogous.

In view of the foregoing distinctions pointed out during the telephone interview, the Examiner acknowledged the differences between the Huesman reference and the present application regarding the term “prospective gating.” *See* Interview Summary mailed November 23, 2007, page 2. However, the Examiner requested that Applicants provide clarification in the claims in order to more clearly emphasize this distinction. Therefore, Applicants amended independent claims 5-12 and 17-20 in response to the Office Action mailed August 22, 2007. Turning now to the claims, Applicants note that each of presently pending independent claims 5-12 and 17-20 generally recites initiating and terminating the acquisition of image data based upon two or more prospective gating points. Applicants further emphasize that these claims were previously amended *in accordance with language suggested by the Examiner* specifically to clarify that the acquisition of image data based upon the recited “two or more prospective gating points” is non-continuous. As such, it is believed that Applicants have made an earnest and good faith attempt to place the present application in condition for allowance.

Nevertheless, in the instant Final Office Action, the Examiner maintained the Section 102 rejection of independent claims 5-12 and 17-20. In particular, the Examiner stated that the Huesman reference discloses initiating and terminating image acquisition based on prospective gating points. *See* Final Office Action, page 4. However, Applicants submit that these statements appear to directly contradict the Examiner’s earlier

acknowledgement in the telephone interview that the image acquisition performed by the Huesman reference is *continuous*. Indeed, in the Interview Summary mailed November 23, 2007, the Examiner acknowledged “appreciat[ing] the differences between the instantly disclosed and reference prospective gating points,” pointed out by Applicants. Interview Summary mailed November 23, 2007, page 2. (Emphasis added). Further, as will be discussed below, the Examiner’s reasons for rejecting independent claims 5-12 and 17-20 in the Final Office Action do not appear to be based on any evidence which refutes the conclusions reached in the previous telephone discussion regarding the teachings of the Huesman reference. As such, Applicants are unable to ascertain as to what reasons the Examiner has presently rejected independent claims 5-12 and 17-20 in clear contradiction of the previously acknowledged teachings of the Huesman reference.

In rejecting independent claims 5-12 and 17-20 in the Final Office Action, the Examiner alleged the following:

Regarding claims 5-12 and 17-20, Huesman (2002) additionally discloses initiating the image data based on a first prospective gating points (“peak inspiration” or “near maximum expiration” p. 4) and also terminates image data acquisition based on a prospective gating point (“7 cardiac gates” p. 4).

Final Office Action, page 4. Thus, it appears that the Examiner, in formulating the instant rejection, has analogized the two respiratory states, “peak inspiration” and “near maximum expiration,” as corresponding to gating points for triggering the initiation of image data acquisition, and each of the seven “cardiac gates” as corresponding to gating points for triggering the termination of image data acquisition. *See* Final Office Action, page 4. However, after reviewing the Huesman reference once again, Applicants do not believe that the Huesman reference teaches or suggests initiating and terminating image acquisition based on prospective gating points, as recited by independent claims 5-12 and 17-20.

As will be appreciated by those skilled in the art, a cardiac organ, such as the heart, may undergo several stages of motion during each cardiac cycle as it pumps blood through the human body. Unfortunately, the cardiac motion is further subject to additional motion imparted by neighboring organs, such as the respiratory organs (e.g., lungs, diaphragm). Due to this unwanted motion, it may be difficult to compare several cardiac images at various points in time, even if each of the cardiac images corresponds to the same stage of the cardiac cycle. The Huesman reference addresses the foregoing problem by providing a solution in which the respiratory motion is removed retrospectively, thus obviating the need for data loss during active gating. *See* Huesman, page 3. Specifically, the passages cited by the Examiner generally relate to the use of image registration techniques for removing unwanted respiratory motion when imaging a cardiac organ. *See id.* at pages 4-5. For example, according to the cited passages, image data representative of respiratory and cardiac organs are obtained over two respiratory states: peak inspiration and near maximum expiration, wherein each state may further include seven cardiac gates or states. *See id.* at page 4. As illustrated in Figs. 4A and 4B of the Huesman reference, without taking respiratory motion into account, the cardiac images, despite being illustrative of the same “gating state,” may exhibit considerable offsets with respect to one another when summed directly. *See id.* at page 5; Figs. 4A-4B. As such, an image registration technique may be applied subsequent to the acquisition of the image data in order to spatially align the images to compensate for the unwanted respiratory motion. *See id.*

However, Applicants submit that nothing in the Huesman reference appears to teach or even suggest that that the peak inspiration and near maximum expiration respiratory states or the seven cardiac gating states are used to initiate or terminate the acquisition of data. Rather, Applicants believe that the Huesman reference is *solely* directed towards the continuous acquisition of data, as discussed above, and that the use of “gates” or “states” is merely a marker used to bin or classify the acquired image data in order to provide information corresponding to the state of cyclical motion the target organ was undergoing at

the time the image data was acquired. As discussed above, this is in stark contrast to independent claims 5-12 and 17-20, which clearly recite that the acquisition of image data is initiated and terminated based on two or more prospective gating points. At best, the Huesman reference appears to disclose that gating states may be used to classify acquired data. However, nothing appears to teach or suggest that the *acquisition* of the image data is initiated or terminated based on these “gating states.”

To provide additional support for this position, Applicants note that the Huesman reference explicitly mentions that “[u]ngated datasets could be synthesized by *summing* the gated data.” Huesman, page 2, paragraph 6. (Emphasis added). In other words, by summing the various groups of binned data, the ungated, or entire original *continuous* set of data may be reconstructed. This is in stark contrast to the recited subject matter, which starts and stops image acquisition based on the prospective gating points, and thus *only* acquires selective *portions* of the image data based on intervals defined by prospective gating points while ignoring the image data outside of the gating intervals. Thus, even assuming hypothetically that the Examiner’s interpretation is correct and that the Huesman reference really does disclose an *interrupted* mode of image data acquisition (e.g., initiating and terminating) based on gating states, the “ungated” datasets could never be fully synthesized because the data outside the defined gating intervals would *have never been acquired*. In other words, the Examiner’s interpretation appears to be contradicted by the plain teachings of the reference itself. As such, Applicants cannot understand how the current claim language could be possibly construed as being anticipated by the Huesman reference.

In view of the foregoing deficiencies, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman reference against independent claims 5-12 and 17-20. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of independent claims 5-12 and 17-20.

2. *The Huesman reference fails to teach or suggest extracting “two or more prospective gating points” and “acquiring a set of motion data using the two or more prospective gating points.”*

Independent claims 1-4, 13-16, and 21-40 recite various systems, methods, and computer programs utilizing a variety of combinations of one or more types of electrical and/or non-electrical sensors for acquiring motion data for one or more organs for purposes of imaging. However, Applicants note that *each* of these claims generally recites acquiring a set of image data representative of an organ of interest (*e.g.*, a human heart) using the two or more prospective gating points. Applicants do not believe these features are disclosed anywhere in the Huesman reference.

Referring to the above discussion once again, “prospective gating,” in accordance with the present application, utilizes one or more prospective gating points extracted from a set of motion data for one or more organs in order to time the acquisition of data. *See* Application, page 1, lines 22-27. For example, the extracted prospective gating points may correspond to one or more intervals of minimal absolute motion for the organ of interest. *See id.* at page 2, line 30 to page 3, line 5. As discussed above, the present application and the claims are directed to the acquisition of image data in an interrupted and non-continuous manner, such that image data is acquired *only* during the time intervals defined by the extracted prospective gating points, and otherwise ignored for those intervals that fall outside of the prospective gating intervals. *See id.* at page 19, line 29 to page 20, line 9; *see also* Fig. 3. By timing the acquisition of image data based upon the prospective gating points, image data is acquired only during the intervals defined by the prospective gating points and ignored otherwise. *See id.* Accordingly, by acquiring image data *only* during these intervals, the presence of motion artifacts in a resulting image set may be significantly avoided. *See id.* at page 2, line 30 to page 3, line 5.

In sharp contrast, the Huesman reference does not disclose acquiring a set of image data using prospective gating points in a manner that is consistent with the present application. That is, rather than relying on extracted gating points to time the acquisition of image data to reduce motion artifacts, the Huesman reference acquires *all* the image data continuously up front, classifies or groups the collected data based on known gating states, and then retrospectively compensates for motion artifacts by applying image registration techniques to the grouped image data. For example, referring now to Figure 5 of the Huesman reference, an imaging system is illustrated for acquiring a continuous stream of data. *See* Huesman, page 6, Fig. 5. The imaging system is configured (*e.g.*, Macintosh® computer running LabVIEW® software) for continuously acquiring data in real time, as illustrated by the cardiac state graph and the respiratory state graph. *See id.* The motions of the cardiac and respiratory organs are further partitioned into various states, each state corresponding to a particular interval in a cycle of motion. *See id.* For instance, the Huesman reference describes partitioning the cardiac motion of a heart into state A, denoted as the “end diastole” stage, state B as the “mid diastole/systole” stage, and state C as the “end systole stage.” *See id.* Similarly, respiratory motion is categorized into states I, II, III, IV, and V, depending on various stages of inspiration and expiration in the respiratory organ. *See id.* The continuous acquisition of image data by the illustrated ECAT HR Scanner is grouped according to a “gating state” determined by the combination of the current states of the respiratory and cardiac organs, and stored into an image volume corresponding to the determined gating state. *See id.*

Indeed, it appears that the term “prospective gating,” as used in Huesman, merely describes classifying different segments of the image data that is acquired *continuously* without any underlying trigger or conditions. As such, Applicants do not believe that the Huesman reference teaches or even suggests that the image data is acquired based on or using previously extracted gating points, as recited in independent claims 1-4, 13-16, and 21-40. As discussed above, even assuming that the “gating states” of the Huesman reference could somehow be considered analogous to the recited “prospective gating

points,” the Huesman reference only appears to disclose, at best, that image data may be grouped or classified based on the “gating states.” It certainly does not appear to teach or suggest that the image data is acquired based on or using the gating states, contrary to the Examiner’s assertions.

In rejecting independent claims 1-4, 13-16, and 21-20 in the Final Office Action, the Examiner merely restated her earlier rejection of independent claims 1-4, 13-16, and 21-40 in the previous Office Action, but provided no additional reasoning or response in view of the arguments set forth in the previously filed Response. *See* Final Office Action, page 3. Therefore, absent any clear line of reasoning or further evidence to the contrary, Applicants submit that the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman reference against independent claims 1-4, 13-16, and 21-40 for at least the reason discussed herein. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of independent claims 1-4, 13-16, and 21-40.

3. *The Huesman reference fails to teach or suggest the use of “two or more prospective gating points” and “two or more retrospective gating points”*

Applicants further note that each of the pending claims, 1-40, recite the use of both prospective and retrospective gating points. This subject matter appears to be entirely absent from the Huesman reference. As discussed above, the Examiner again merely restated in the Final Office Action, the earlier rejections set forth in the previous Office Action. However, the Examiner provided absolutely no additional reasoning or basis in view of the arguments set forth in the previously filed Response. Rather, the Examiner simply re-asserted that Huesman discloses extracting two prospective gating points associated with a respiratory organ (*e.g.*, end inspiration and end expiration) and

extracting two retrospective gating points associated with a heart (e.g., end-diastole and end-systole). See Final Office Action, page 3. Applicants respectfully submit that the Examiner's rejection with regard to this claim feature is improper for the reasons set forth below.

First, Applicants submit that this proposed correlation is improper, as the Examiner has *already* correlated cardiac gates (e.g., states of heart motion) to *prospective gating points* in the rejection of independent claims 5-12 and 17-20, as discussed above. It is well established case law that in order to establish a *prima facie* case of anticipation, the Examiner must demonstrate the cited reference discloses not only all of the recited features but must also disclose the part-to-part relationships between these features. See *Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir.1984). In other words, the Examiner cannot correlate the cardiac gating states to one recited element in rejecting a first claim, and then later correlate the same cardiac gating states to a different recited element in an attempt to reject a second claim.

Further, even assuming for the sake of argument that the Examiner's correlation of the cardiac states "end-diastole" and "end-systole" could be supported in view of the case law, Applicants are unable to identify any explicit language or teaching in the Huesman reference which explains how the Examiner has reached this interpretation. That is, there does not appear to be any rationale in the Huesman reference suggesting that the respiratory states "end inspiration" and "end expiration" correspond to prospective gating points or that the cardiac states "end-diastole" and "end-systole" correspond to retrospective gating points. Instead, the Huesman reference merely states that "[t]he cardiac and respiratory states are used to elect an output gating state from a 2D lookup table." Huesman, page 6, paragraph 1. In other words, the Huesman reference appears to disclose that the binning or classification of the incoming image data is based on both the current cardiac and respiratory state. Thus, even assuming hypothetically that the "gating states" mentioned in the Huesman reference could be properly correlated with

the recited “prospective” or “retrospective” gating points,” there does not appear to be any difference in the way cardiac and respiratory gating states are used to classify the incoming image data. Therefore, even *if* the gating states disclosed by the Huesman reference could hypothetically be correlated with either prospective or retrospective gating points, it certainly does not appear that the Huesman reference discloses *both* prospective and retrospective gating.

Thus, absent additional clarification as to how the Examiner has reached this arbitrary and speculative conclusion that respiratory states necessarily constitute *prospective* gating and that cardiac states necessarily constitute *retrospective* gating points, Applicants submit the Examiner has failed to establish a *prima facie* case of anticipation under the Huesman reference against independent claims 1-40. As such, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of claims 1-40.

Double Patenting

In the Final Office Action, the Examiner provisionally rejected claims 1-40 under the judicially created doctrine of obviousness-type double patenting over claims 1-32 of co-pending Application No. 10/723,894 in view of the Huesman reference. In view of the provisional nature of the present double-patenting rejection, Applicants defer response until an indication of allowable subject matter is received on at least one of the co-pending applications.

Conclusion

In view of the remarks set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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